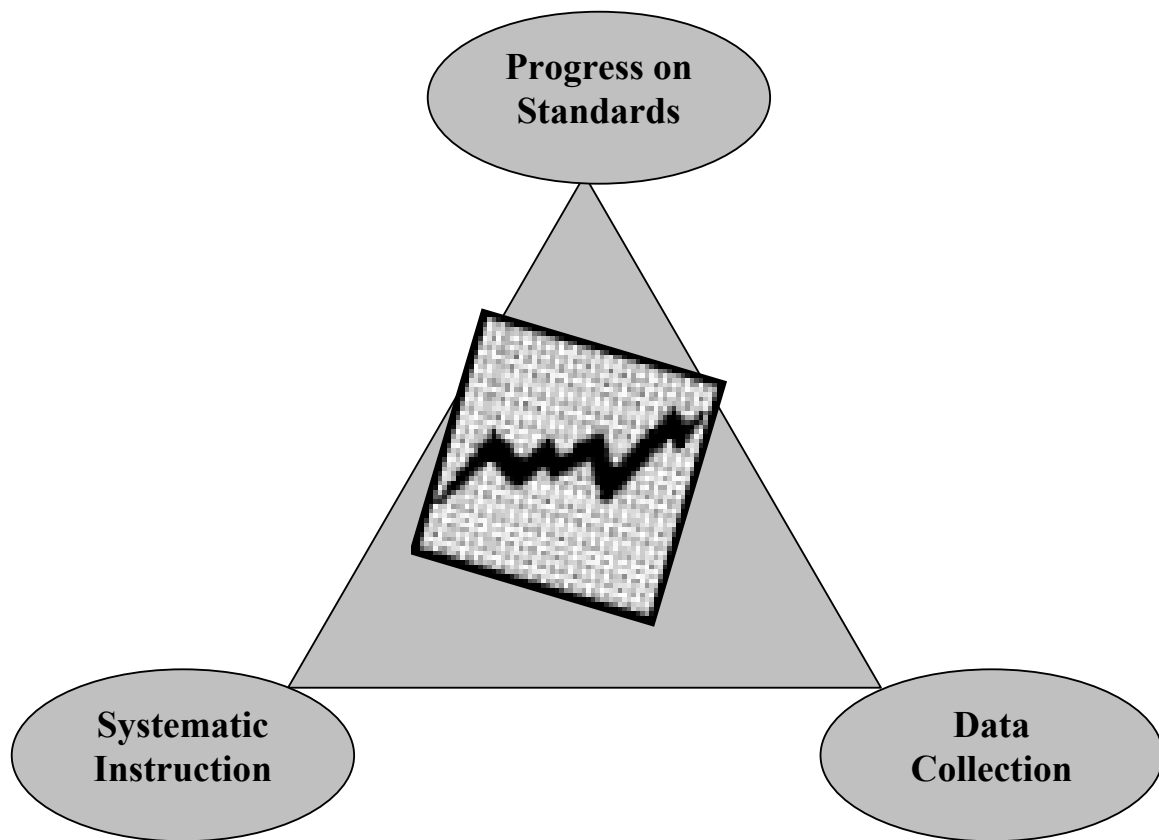


Systematic Instruction and Data Collection

Module and Workbook



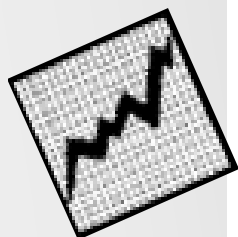
Developed by
Inclusive Large Scale Standards and Assessment Group
University of Kentucky
2003

Data Collection and Systematic Instruction

Data collection is an essential component of good instruction. It not only indicates the level of a student's performance but can also give information as to the effectiveness of accommodations, modifications, and adaptations, the type of support that is most effective for a specific student, and when to change instruction. Data collection is necessary to make good instructional decisions. It provides the required information for IEP monitoring and other accountability measures. Without data, instructional decisions are less objective and can lead to erroneous assumptions about student performance.

There are three main types of data collection – student products, anecdotal recording, and recording of student responses:

- Student products are those things that are created by the student him/herself, such as writing samples, computations, book reports, budget reports, art work, etc. These products can be used to measure student performance in two ways: status (i.e., grade or evaluation of one piece of work which shows present level of performance) or progress (i.e., comparing two or more work samples to show how performance has changed over time.) When showing progress, it is important to utilize comparable work samples (e.g., addition to addition as opposed to addition to subtraction). The collection of student products is usually accomplished through some compilation format such as a portfolio.
- Anecdotal records are short narratives of how a student performed in a specific activity. To be most useful, this type of data needs to be specific (e.g., “Jason used a complete sentence in answering a question today” vs. “Jason spoke better today”). Anecdotal records can be used to either show status or progress in the same manner as student products. These records could be documented directly on actual student work, on a calendar, in a teacher notebook, or journal or through some other means.
- The recording of student performance record is the most typical type meant when the term “data collection” is used. The remainder of this module will be concerned with this type of data collection.



notes

Step by Step Data Collection Process

Step 1

Clearly define the target behavior/skill to be observed

It is critical to identify the skill that is to be measured and to distinguish between skills vs. activities. Skills typically can occur in a wide variety of contexts while activities are specific to one situation, environment, or context.

Skills would include such behaviors as:

- eyegaze
- reach/grasp release
- symbol/word identification
- number identification
- computation

Activities are the context in which the skills can be applied:

- eyegaze – to choose lunch items, to pictures in a book, peers
- reach/grasp/release – items for a science experiment, put materials away, play a game
- symbol/word identification – read community signs, identify sight words in a novel, identify restaurant logo upon request
- number identification – turn to correct page in a book, press the correct floor on an elevator, identify a price
- computation – develop a budget, add perimeter of triangle, complete a math worksheet

Guided Practice

Review the list below and identify each as a skill or an activity by placing a checkmark next to the items that are skills.

- | | |
|---|--|
| <input type="checkbox"/> Making a bed | <input type="checkbox"/> Pick up puzzle pieces |
| <input type="checkbox"/> Count | <input type="checkbox"/> Complete a math worksheet |
| <input type="checkbox"/> Read for information | <input type="checkbox"/> Pick up materials |
| <input type="checkbox"/> Go bowling | <input type="checkbox"/> Add numbers |
| <input type="checkbox"/> Identify sight words on menu | <input type="checkbox"/> Respond to name |

**Answers located on last page of module.*

notes

Step 2 Define the criterion for an acceptable performance The next step is to identify when you will know if the student has mastered the skill. This is known as setting a criterion. Typically a criterion is set for a skill that corresponds with the number of possible observations of that skill. For example, given a set of picture symbols, Jose will point to the correct picture to answer to five questions with 100% accuracy. Another type of criterion statement might identify to what degree the student performed the skill independently. For example, Mallory will independently point to the correct picture 5 of 5 opportunities.

It is important to specify when a student's performance has reached a predetermined level. In this way one can make decisions to adjust the instruction, method of monitoring, or the goal. There are two performance components to consider – accuracy and independence. Accuracy is how many trials or responses are correct. The independence level indicates how much assistance or cues are required by the student in order to get the correct response.

Accuracy:

Eyegaze to required materials *15 of 20 times (75%)*

Reach/grasp/release math counters *7 out of 10 opportunities (70%)*

Identify requested picture symbol *90% of trials*

Identify numbers from 0 – 20 *with 85% accuracy*

Add single digit numerals *90% of the time*

Independence:

Eyegaze to required materials *15 of 20 times (75%) with verbal cues*

Reach/grasp/release math counters *7 out of 10 opportunities (70%) with a model*

Identify requested picture symbol *90% of trials independently*

Identify numbers from 0 – 20 *with 85% accuracy by himself*

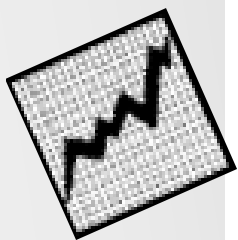
Add single digit numerals *90% of the time with no assistance*

Iowa Alternate Assessment requires data to be collected on both accuracy of performance on the benchmark and independent use of adaptations.

Guided Practice

Underline the criterion for acceptable performance in each objective.

- Chantall will reach and grasp with verbal cues 80% of the trials over three consecutive days in the following activities: reading, turning pages, using markers or stamps, receiving a worksheet, handing in reading home work.
- Jeremy will choose between three geometric shapes by himself four out of five opportunities (80%) in the following activities: making a collage, building a model, creating a tangram, matching shapes in a hidden picture worksheet.
- Andrea will independently count items as needed correctly three out of three times (100%) for three opportunities in the following activities: getting enough supplies for science activity, purchasing items from the bookstore, counting out needed math manipulatives.



notes

- Enrique will read the directions correctly 90% with no assistance of the time in the following activities: complete class assignment, open a computer program, or completing a social studies project.

**Answers located on the last page of module.*

Step 3

List a sample of activities in which the student will perform the behavior

The first context in which to identify activities where the student can use the skill is in the general curriculum. This is included in the three steps to developing annual goals in the 5 Phases of the IEP Process Handbook, Iowa Department of Education.

By examining the instructional and noninstructional activities engaged in by typical students throughout the course of a school day, one should be able to identify frequent instructional opportunities on IEP goals. If opportunities are nonexistent or infrequent, the goal may not be meaningful in the context of general curriculum and standards referenced instruction.

- Eyegaze to *objects representing events in a novel, material needed for a science project, pictures in a social studies text*
- Reach/grasp/release *math counters, homework materials, objects representing schedule*
- Identify picture symbol to *answer question in reading, to indicate choice of adaptation, to communicate content area knowledge*
- Identify numbers from 0 – 20 to *keep score in P.E. class, find correct page in text, use a calculator to solve problems*
- Add single digit numerals to *complete math homework, to determine the number of electrons in two shells, to play a math computer game*

Guided Practice:

Complete the following activity matrix by marking an x in each cell that the IEP goal can be addressed.

	Reading Math	Science	Social	Studies
Eyegaze				
Reach/grasp/release				
Identify symbols				
Identify numbers				
Add single digits				



notes

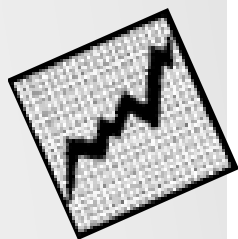
Step 4**Determine an appropriate systematic instructional plan**

To ensure that a student learns the specific skill/concept presented, an instructional plan must be determined and performance monitored by means of data collection. This plan may include systematic instruction techniques described in the following paragraphs as well as strategies such as providing the student a tool (e.g., word bank), assistive technology (e.g., pictures paired with words), advanced organizer (e.g., computer based graphic organizer such as Inspirations), and other teaching strategies utilized in the general education environment. The key is to identify the plan and closely monitor performance rather than leaving it to chance. Too often when the student does not learn the material, he or she is faulted instead of the instruction which was provided.

Systematic instruction is the direct teaching of skills following a specific instructional strategy. Some common types of systematic instruction are repeated trial, scaffolding, system of least prompts, time delay, and task analysis.

Repeated trial instruction is when the student is asked to respond several times in one instructional session. As students with disabilities partake in ever increasing general education activities, effective teachers are finding times within and across students' days in which to provide instruction and still use systematic techniques. Indeed, some studies have found that when trials are distributed across the day, the student learns the skill faster and generalizes the skill more quickly. Refer to activity matrix in the previous step in order to embed trials throughout the school day. Following are examples of how Carlos and Evelyn (described in Section B in the Educator's Guide) are provided with distributed trials throughout the day:

- Carlos is given the opportunity to eyegaze when: greeting peers in the morning, identifying the date in homeroom, choosing which book to read, selecting his partner in science, etc.
- Carlos is given the opportunity perform reach/grasp/release while hanging his coat up, participating in a science experiments, working with math manipulatives, eating lunch, passing out materials, etc.
- Carlos is given the opportunity to identify symbols in social studies class to identify landforms, in science class to match animals and habitats, in art class to select medium.
- Evelyn is given the opportunity to identify numbers by locating/identifying: the correct page in various textbooks, the date, numbers on the clock, her lunch number, her room number, etc.
- Evelyn is given the opportunity to complete computation problems in math class, in an economics class, in P.E. class, at the store, in the computer lab, etc.



notes

- Evelyn is given the opportunity to work on reading sight words by reading an adapted novel in language arts, reading directions for science experiment, reading an excerpt from social studies book, and reading information on the Internet.

Scaffolding is providing supports to the student which will assist in learning and yet provide only the amount of support needed. The support is then removed gradually. Scaffolding provides the student with needed supports in the areas needed that will allow the student to acquire skills within the range of capabilities. Once that concept or learning is acquired the student can then move on to another aspect of the learning process. Scaffolding may include prompting, models, support tools (e.g., word bank, reference, adaptation, manipulatives), peer support, alternate way to interact with learning materials, etc.

System of least prompts is requesting the student to accurately perform the skill provided with the least intrusive prompt possible first. The prompt level is successively increased as needed in order for the student to perform. This allows the student the opportunity to respond before the teacher provides the next prompt level and allows students the opportunity to respond independently before assistance is provided. A similar and related technique is to provide the student with the highest level of prompting and fade as student gains accuracy (most to least prompts). This is generally used for students who need to be prompted through the task first in order to facilitate learning and allows students access to assistance before the student attempts the task and makes errors.

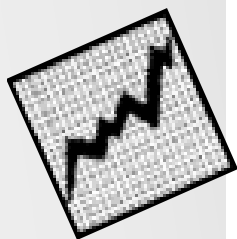
Stinson, D., & Farmer, R. (2001). Fayette County Schools, Department of Special Education.

- **Least to most prompt**

1. verbal request
2. verbal request with gestural model
3. verbal request with physical prompt
4. physical guidance

- **Most to least prompt**

1. physical guidance
2. verbal request with physical prompt
3. verbal request with gestural model
4. verbal request



notes

Time-delay requires that the student be given an “errorless trial” by the teacher insuring that no mistakes will be made in the trial. Then the teacher waits for an increasingly longer period of time before giving the errorless prompt (i.e., the correct response). Incorrect responses are redirected and/or corrected. Different types of prompts are not given, the only prompt is the correct response or answer.

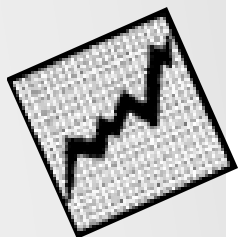
Identifying symbols

1. Show the student the symbol
2. Say, “What is this symbol/word?”
 - *Progressive time delay* - wait 0 seconds during the first session, progressing 1 second each session.
 - *Constant time delay* - wait 0 seconds during the first session, then move to a set number of seconds (i.e. 3 seconds).
4. At 0 seconds, provide the answer immediately *each* time. At more than 0 seconds, wait the appointed time and then provide the answer.
5. If the student responds correctly, praise; if the student responds incorrectly, say, “No, the word is -----,” and ask the student to repeat you.

Task analysis consists of breaking a complex skill or activity into discreet steps. These steps are then taught in sequence through either backward or forward chaining. Typically, the instructor will teach every step included in the activity, provided prompts as necessary.

Adding single digits using a calculator

1. locate first addend
2. locate the matching number on the calculator
3. press the number
4. locate and press the “+” button
5. locate the second addend
6. locate the matching number on the calculator
7. press the number
8. locate and press the “=” button
9. write the number in the correct location



Task analyze logging onto the internet or opening a word processing program, begin typing, and saving the document.

[illegible]

Design a data collection sheet and collect data

- Skill to be measured
- Instructional strategy
- Definition of mastery (i.e., when to move the next step)
- Conditions for performance (i.e. where, when, and how)
- Accuracy level
- Ease and clarity
- Dates recorded on data

notes

- Key to data
- Data needs to be collected over time with a minimum of three data points
- Summative percentage

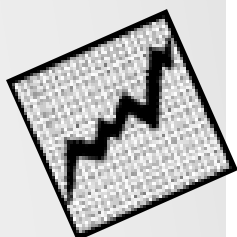
A variety of data recording procedures include frequency of occurrences, duration, latency, and trial/opportunity-based. The skill being measured and the individual student and the instructional context facilitate the decision of which would be the most effective procedure. A skill such as time on task would lend itself best to duration recording while spelling name correctly would be most easily measured by opportunity-based recording.

Recording the frequency of occurrences indicates the number of times that the student performs a skill or exhibits a behavior during a predetermined observation period. In an activity in which the student should increase the number of times the skill is performed, such as word calling, this procedure would provide the needed information.

Recording the duration of a skill/behavior measures the amount of time the student performs the skill or exhibits the behavior during a predetermined observation period. A goal for grasping classroom materials for an increasing amount of time could be measured by duration recording.

Latency is the duration of time between the start of the opportunity or the “request” and the student response. This recording procedure would adequately measure an objective of decreasing the time taken to initiate a behavior such as activating a switch to advance a Power Point slide.

Trial or opportunity-based recording offers information on steps completed, prompts needed, and accuracy level. A skill that has been task-analyzed, such as using a calculator, could be recorded using this data recording procedure. Upon determining the data recording procedure, the data collection sheet should be designed to reflect the selected procedure as well as including additional needed information such as settings or instructor. Recording the objective which includes the criterion for mastery along with the goal for accuracy and independence clarifies the data for unfamiliar persons.



Sample Data Sheet

Objective with criterion for mastery

Task steps

Key

Student: *Shannon* Dates: *xx/xx/xx*

Objective: Shannon will complete addition problems with a calculator with 90% accuracy averaged over one month

Standard Connection: *Solve equations*

Task Analysis Steps	Date	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
	Setting	M	S	S	M	S	M	M	S	C	M	
<i>Locate first addend</i>		P	P	P	+	+	+	P	+	+	+	+
<i>Locate the matching number on the calculator</i>		P	P	P	P	P	+	+	+	+	+	+
<i>Press the number</i>		+	+	+	+	+	+	+	+	+	+	+
<i>Locate and press the "+"</i>		-	+	+	P	-	+	+	P	P	+	+
<i>Locate the second addend</i>		P	P	P	P	+	+	+	P	+	+	+
<i>Locate the matching number on the calculator</i>		P	P	P	-	-	P	+	+	+	+	P
<i>Press the number</i>		+	+	+	+	+	+	+	+	+	+	+
<i>Locate and press the "=" button</i>		-	-	-	P	P	-	P	P	P	P	P
<i>Write the number in the correct location</i>		P	P	P	P	+	+	+	+	+	+	+

Key

Key: + correct P correct with prompt - incorrect

S=special ed. Room M = 4th gr. Math class C = community

Comments:

Accuracy: 22/27 81%

Dates and settings

Summative Data

notes

Guided practice:

Match the skill or instructional strategy to an effective data recording procedure.

*Skill or instructional strategy**Data recording procedure*

Identify symbols on a worksheet

Duration

Initiating use of communication
board upon being asked a question

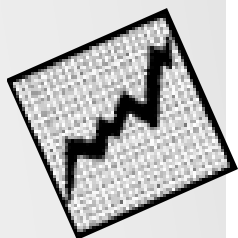
Frequency

Increase time on task

Latency

Increase number of correctly read
words in 2 min. time periodTrial or
opportunity**Answers are located on last page of module***Step 6****Chart or graph the data**

Graphing and charting presents the data in a visual format which makes it easier to draw summative conclusions as opposed to raw data, which give more detailed information about specific performances. Charts and graphs can be formatted as bar graphs, line graphs, pie charts, etc. The two most commonly used graphs are line graphs and bar graphs. It is generally preferable to convert raw data into percentages before graphing or charting. For the purposes of Iowa Alternate Assessment it is necessary to provide summative data in percentage form in order to score in the Breadth component of the Student's Achievement of Benchmarks dimension. This makes data much more comparable over authentic instructional sessions (content area classes and other times for embedded skill instruction) that may have unequal numbers of opportunities for responses. For example, on Monday a student may have 12 opportunities for using a switch during small group instruction in language arts and on Tuesday there may only be nine opportunities. Data can be charted for each data point or charted by weekly or monthly compilation. In designing graphs and charts, careful attention should be made to include as necessary:



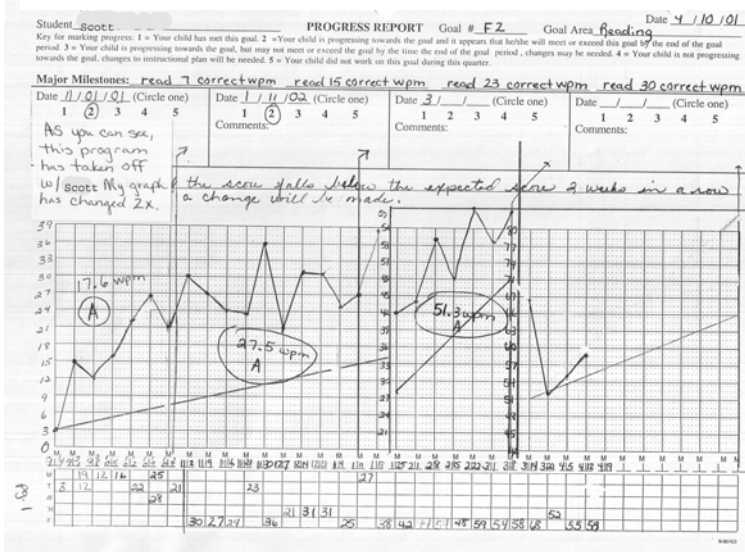
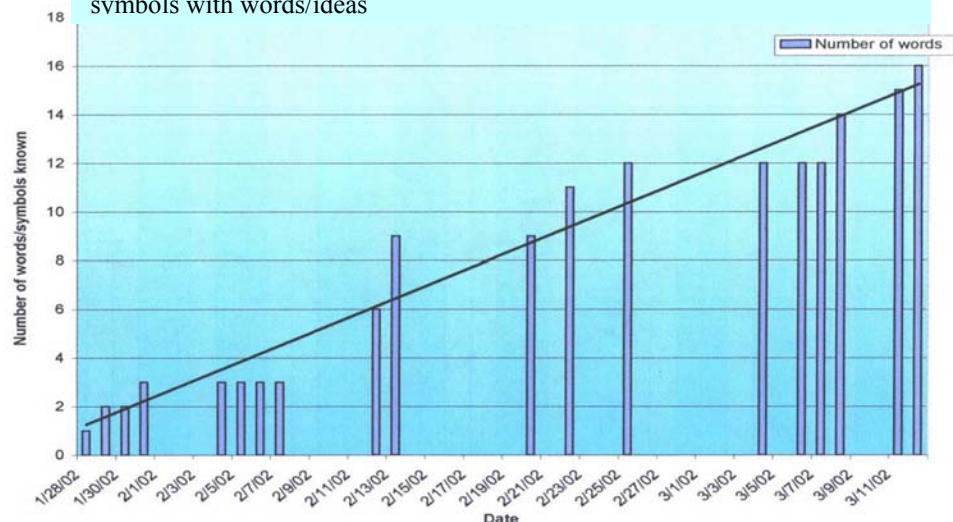
notes

- Vertical and horizontal axis that are clearly labeled as to what they represent
- The skill being measured
- Data legend or Key
- Settings (only applicable if each session is graphed)
- Accurate responses
- Any notes regarding atypical responses or other considerations to remember
- At least 3 data points (could be daily, weekly, monthly but they should represent the student's performance over time; if daily or weekly data is recorded more than 3 data points would need to be shown to actually document observations over time)

Sample bar graph

Objective: xxx will identify 4 new picture symbols per month with 80% accuracy

Standard: Student will understand information they have read: associates symbols with words/ideas

**A sample
line graph**

notes

Step 7 Analyzing the data Once the data have been graphed/charted, the most basic analysis is to determine if there is a trend. To determine if a trend is evidenced, compare the first few data point(s) with the last few data point(s) to see if the performance has increased or decreased. Then examine the data points in between to see if that trend is supported in general. Certainly, other more discreet analysis may be necessary (e.g., is performance better on Mondays than Wednesdays, is the performance in science class different from the performance in music, does the performance change as the day progresses, what effect did a different reinforcer/consequence have on the performance, etc.). A more complete analysis of the data gives a better understanding of the student's performance and the effect(s) of instruction.

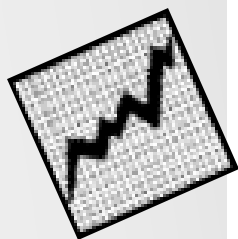
Guided Practice:

Look at the preceding line graph to answer the following questions.

- a) Does the trend indicate that the student skill is increasing or decreasing?
- b) Do the data points in between the first and last points support the trend?

Analysis of the data should result in effective instructional decisions. If data indicate unacceptable levels of student performance based on projected IEP goal, the following considerations should be discussed (discussions should not be limited to these considerations):

- Instructional strategies
 - ☐ Is systematic instruction being implemented
 - ☐ Is there a match between the systematic instruction approach and the skill?
 - ☐ Is it being taught consistently throughout the day?
 - ☐ Is the skill being taught in a curriculum based context?
 - ☐ Is the student being adequately reinforced?
 - ☐ Are there an adequate number of instructional opportunities throughout the day?
- Supports
 - ☐ Are there appropriate , meaningful adaptations/modifications/assistive technologies in place?
 - ☐ Is the student able to use them?
 - ☐ Are they readily available for student use?
- Self-determination
 - ☐ Does the student have some control in the goal setting, materials, strategies, activities, and places to learn?
 - ☐ Does the student have opportunities to evaluate performance by determining what is acceptable and what needs to be improved about performance?



notes

- Settings
 - ☐ Does the student have the opportunity to learn/practice/apply the skill in a variety of settings and contexts?
 - ☐ Does the performance vary across settings?
- Environmental
 - ☐ Are there environmental concerns (e.g., medical, emotional, physiological)?



Frequency or Trial/Opportunity Recording

Student Name:

Targeted Performance:

Data Legend:

Date(s):

Standard:

Accuracy:

20																			
19																			
18																			
17																			
16																			
15																			
14																			
13																			
12																			
11																			
10																			
9																			
8																			
7																			
6																			
5																			
4																			
3																			
2																			
1																			
Date																			
Setting																			

Percentage Graph

Student:
Objective:
Key:

Dates:
Standard Connection:
Accuracy

100																			
95																			
90																			
85																			
80																			
75																			
70																			
65																			
60																			
55																			
50																			
45																			
40																			
35																			
30																			
25																			
20																			
15																			
10																			
5																			
0																			
Date																			

Frequency or Trial Opportunity Recording

Student Name:

Targeted Performance:

Key:

Dates:

Standard:

Accuracy:

20																			
19																			
18																			
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4																			
3																			
2																			
1																			
Date																			
Setting																			

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Resources

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notes

Answers to Guided Practice

Page 3, skill vs. activity: *Skills: count, read for information, pick up materials, add numbers, and respond to name.*

Page 4, Criterion for performance:

- Chantall will reach and grasp with verbal cues 80% of the trials over three consecutive days in the following activities: reading, turning pages, using markers or stamps, receiving a worksheet, handing in reading home work.
- Jeremy will choose between three geometric shapes by himself four out of five opportunities (80%) in the following activities: making a collage, building a model, creating a tangram, matching shapes in a hidden picture worksheet.
- Andrea will independently count items as needed correctly three out of three times (100%) for three opportunities in the following activities: getting enough supplies for science activity, purchasing items from the bookstore, counting out needed math manipulatives.
- Enrique will read the directions correctly 90% with no assistance of the time in the following activities: complete class assignment, open a computer program, or completing a social studies project.

Page 12, Effective data recording procedure

Duration – increase time on task

Frequency – increase number of correctly read words in 2 min. time period

Latency – initiating use of communication board upon being asked a question

Trial or opportunity – identifies symbols on a worksheet

Page 14, Analyzing data

a) increasing

b) yes

